

Light Reflection for Ray Tracing

When light hits a surface (a change in medium), some of the light is reflected back and some is refracted into the new medium. Reflection is the process by which some portion of the incident light is reflected back into the same medium at an angle equal to the angle of incidence. More specifically, the vector \hat{S} is the reflection of the incident light vector \hat{I} across the surface normal \hat{N} .



\hat{N} is the smooth-surface normal.
 \hat{I} is the inverse of the ray direction.
 \hat{S} is the reflection of \hat{I} around \hat{N} .

For refraction, a portion of the light enters the surface and is refracted into the new medium at an angle.



The bending occurs because the light changes speed as it enters the new medium and the angle of refraction is different from the angle of incidence.

on the surface of a body which is not light
smooth the light is scattered in all directions
in all directions.

Ordering an opaque point usually comes from the
light components: incident spectrum & diffuse.
Since a surface is not perfectly smooth.

Surface reflection.

Spatial reflection is the scattering of light in all
directions from the surface of the object at a point
where the light is incident. It is a reflection of the
light in all directions.

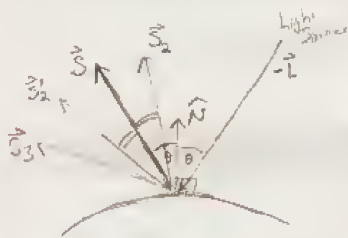
Spectral reflection is the scattering of light in all
directions from the surface of the object at a point
where the light is incident. It is a reflection of the light in all
directions.

However, these highlights are not perfectly spread out. This
is because most surfaces aren't perfectly smooth, even polished
surfaces. In reality, the surface is made up of tiny bumps and
grooves. These bumps and grooves cause the light to be scattered
in a Gaussian distribution whose average is the
specular reflection. The light is scattered in all directions
in a Gaussian distribution.

In more detail, the microscopic roughness of the surface
causes the light to be scattered in all directions. The
roughness of the surface causes the light to be scattered in all
directions. The light is scattered in all directions.

For an ideal smooth surface, light strikes the surface & bounces off at the opposite angle. If your eye isn't in the path of the reflection, you won't see it. If you're looking for a, there are a lot of more surfaces are going to cause some of the light to be reflected back into the eye, even if it's not at the maximum angle for the light.

Because of the geometry, the more the more, you'll get the most reflection back in a mirror direction, and the more the more, the angles.



The most light is reflected at the smooth-surface specular reflection vector \vec{S}_1 . Eyes far away along $\vec{S}_1 + \vec{S}_2$ (each at equal angle to \vec{S}) will get less light than \vec{S}_1 (but will get more light than \vec{S}_2 and \vec{S}_3 , etc.).
 as anything in this case, and \vec{S}_1 , etc.
 greater angle to \vec{S} , will get even less.

... can be approximated by the ... of ...
 ... from the point of reflection to the eye, to the ...
 ... the distance the light travels, more ...

Many materials reflect all ... about ...
 ... so the ... of ... is ... of ...
 ... the ... of ...

Mostly, the material, usually reflect only certain colors,
the rest is absorbed. The color of the material is determined
by the wavelengths of light that are reflected.

Reflection

If a material is perfectly white, it reflects all the
wavelengths of light. If a material is black, it absorbs all
the wavelengths of light. If a material is colored, it reflects
only certain wavelengths of light and absorbs the rest.

The color of an object is determined by the wavelengths of
light that it reflects.

White objects reflect all the wavelengths of light. Black
objects absorb all the wavelengths of light. Colored objects
reflect only certain wavelengths of light and absorb the rest.

The color of an object is determined by the wavelengths of
light that it reflects. For example, a red object reflects
red light and absorbs all the other wavelengths of light.

The refraction is also what gives most water its most of their
color. Different frequencies are absorbed at different
rates, so the water appears blue.

Simple experiments show that the color of an object is
determined by the wavelengths of light that it reflects.
For example, a red object reflects red light and absorbs
all the other wavelengths of light.

special highlights are calculated by $\frac{1}{r^2}$ with ambient
light, and the surface normal vector.

For an ideal diffuse ambient light, a equally distributed
in space, the diffuse reflection is same in any angle
into camera; its the same in all directions. Instead
of the standard cosine ray-tracing.



- Specular reflection is the reflection of light off a
smooth surface, where the angle of incidence is equal to the
angle of reflection. The surface is smooth, and the light waves are
reflected in a single direction with frequencies equal to the
incident light.



- Diffuse reflection is the reflection of light off a
rough surface, where the angle of incidence is not equal to the
angle of reflection. The surface is rough, and the light waves are
reflected in many directions with frequencies equal to the
incident light.

- Ambient reflection is the reflection of light off a surface
where the light is coming from all directions.